



Fact Sheet:

SMALL ARMS RANGE NOISE ASSESSMENT MODEL (SARNAM)

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The Problem

Realistic training for soldiers includes firing weapons at small arms ranges on military installations. Noise from these ranges often annoys people living in the surrounding community. Their responses may include noise complaints, political pressure, legal action, and efforts to curtail or stop the firing. In an effort to preserve this critical training activity, the Army enforces a regulation (AR 200-1) that includes, among other environmental assessments, an evaluation of community noise exposure and a plan to minimize annoyance to local residents. Complying with AR 200-1 requires the installation to produce noise contour maps that support development of the Environmental Noise Management Plan (formerly called Installation Compatible Use Zone -- ICUZ). The National Environmental Policy Act (NEPA) also includes requirements to assess impacts of any proposed action that may affect the environment; noise is often one of the primary issues.

The Technology

A research team led by the U.S. Army Construction Engineering Research Laboratories (CERL) developed the Small Arms Range Noise Assessment Model (SARNAM) to help military installations comply with noise assessment mandates. SARNAM is software that provides the capability to calculate and display noise level contours for firing operations at small arms ranges. It includes consideration

of type of weapon and ammunition, number and time of rounds fired, range attributes such as size and barriers, metrics and assessment procedures. It accounts for spectrum and directivity of both muzzle blast and projectile bow shock, which facilitates accurate calculation of propagation and sound attenuation by barriers. Source model parameter values are based on empirical data. The propagation algorithm assumes a moderate downwind propagation condition and is based on sophisticated calculations and experimental data. SARNAM offers a choice of sound exposure level (SEL) and day-night noise level (DNL) metrics. A variety of frequency weightings are available. SARNAM features a user-friendly point-and-click graphic user interface, pull down menus, and on-line help, and is designed to maximize user productivity. A library of database records, including weapons (military and commercial), metrics and frequency weighting schemes, is included as part of the software package, and the user can define and store additional entries. Display of calculated noise contours is via NMPlot (developed by the U.S. Air Force). Results can be ported to a geographic information system (GIS) system via selected file formats. SARNAM is Windows 95/NT software that can be run on desktop computers. The graphical user interface facilitates input of information required for noise impact assessment. Many uses of SARNAM will not require an acoustics expert, particularly for planning training activities; however, it does require knowledge about training procedures and weapons and basic familiarity with noise characterization metrics.

Benefits/Savings

SARNAM will satisfy several requirements crucial to preserving military training capability. The program quantifies small arms range noise impact. This facilitates noise management and planning for existing and new ranges. Noise management capabilities include assessing long-term community noise impact, examining noise levels due to a particular firing event, planning range operations, and exploring noise ramifications of range design options such as siting,

orientation, barriers, and safety baffles. Noise assessment capability is an essential part of an encroachment management program, which can avoid the need to purchase noise-impacted land and also reduce noise complaints. The complexity and computational labor of calculating noise contours demands a computerized tool for cost-effectiveness and practicality.

In addition to supporting the military training mission, SARNAM can assist other organizations that operate small arms ranges such as law enforcement, recreational, and competitive firing facilities. These public sector ranges also must contend with public opposition to high noise levels.

Status

SARNAM has been delivered for beta testing to the U.S. Army Center for Health Promotion and Preventive Medicine ([USACHHPM](#)), a Medical Command that serves as blast noise consultant for the Department of Defense. The program will be optimized based on feedback from USACHHPM's demonstrations during FY99. Plans are to make the software available to Government users at minimal cost in CD ROM format via a Cooperative Research and Development Agreement (CRADA) with a commercial software vendor. All technical support will be provided by USACHPPM.

Points of Contact

CERL POPC is [Dr. Larry Pater](#), COMM 217-373-7253; toll-free 800-USA-CERL; FAX 217-373-7222; email l-pater@cecer.army.mil; or CERL, ATTN: LL-P, P.O. Box 9005, Champaign, IL 61826-9005.

USACHHPM POC is Mr. William Russell, COMM 410-436-3829.

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